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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/036,303	12/28/2001	Frank Hawley	ACT-307DVA	2755

7590 02/27/2004

Kenneth D'Alessandro
Sierra Patent Group, Ltd.
P.O. Box 6149
Stateline, NV 89449

EXAMINER

MAI, ANH D

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 02/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/036,303	Applicant(s) HAWLEY ET AL.	
	Examiner Anh D. Mai	Art Unit 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 November 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 5-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 5-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of the Claims

1. A Response to Office Action filed November 3, 2003 has been entered. Claims 5-10 are pending.

Declaration

2. Declaration filed May 27, 2003 has been considered. However, the issue at hand (annular trench) did not find support in the originally filed specification.

Drawings

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the “a single isolation trench having uniform-cross section” must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Response to Amendment

4. The amendment filed August 28, 2002 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: “forming a single isolation trench having a uniform cross-section to define an active region”; “an **annular trench**” (paragraph 18, and

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claim 5); “shown in Fig. 3 as well as the sidewalls of the front and rear portions of the trench lying outside of the plane of Fig. 3” (paragraph 19); “**annular isolation trench 62...isolation trench 62 is**” (paragraph 22); “**isolation trench 62**” (paragraph 23) “**trench 62**” (paragraph 25) and “**isolation trench 62**” (paragraph 26).

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 5-10 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 5 recites: forming a **single** isolation trench **having a uniform cross-section** to define an active region.

How a **single trench** is formed to define an active region ? This does not appear to be possible.

6. Claims 5-10 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which **was not described in the specification** in such a way as to reasonably convey to

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one skilled in the relevant art that the inventor(s), **at the time the application was filed**, had possession of the claimed invention.

There does not appear to be a written description of the claim limitation “forming a **single** isolation trench **having a uniform cross-section** to define an active region” nor “**annular trench**” in the application as filed.

Note that, through out the specification, the isolation is disclosed as “**isolation trenches 62**” and the active region is defined by, two, more than one isolation trenches 62.

The specification does not support any trench “having uniform cross-section” nor trenches 62” are annular trench.

The specification **is completely silence** on whether the trenches are uniform cross-section.

Be advise, to resolve this problem, applicant is advised to file a C-I-P (continuation-in-part) so that **new matters** can be entered.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 5-10 are further rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

“a single trench” can not define anything, thus, indefinite.

To define an area, such as an active region, the area should be bound by at least two, for 2 dimensions, markers, in this instant, two trenches.

Claim Rejections - 35 USC § 102

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

8. Claims 5-7 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Mehta et al. (U.S. Patent No. 5,646,063), of record.

With respect to claim 5, as best understood by the examiner, Mehta teaches method for fabricating a shallow-trench isolation transistor on a semiconductor substrate as claimed including:

forming an isolation trench (44) to define an active region (38) in the silicon substrate (14);

performing sidewall isolation implants on the side and bottom walls of the isolation trench (44);

depositing a dielectric isolation material (60) in the isolation trench (44);

planarizing the top surface of the silicon substrate(14) and the dielectric isolation material (60);

forming a gate oxide layer (135) over the active region (38) in the silicon substrate (14);

forming and defining gate (108) regions over the gate oxide layer (135) in the active region (38) in the silicon substrate (14); and

forming source and drain regions (112/114) in the active region (38) in the silicon substrate (14). (See Figs. 2-9).

Note that, the trench (44) of Mehta having uniform cross section.

With respect to claim 6, as best understood by the examiner, the sidewall implantation of Mehta comprises implanting p-type impurities.

With respect to claim 7, as best understood by the examiner, implanting p-type impurities of Mehta comprises implanting boron.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

9. Claims 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mehta '063 as applied to claims 5 and 6 above, and further in view of Liaw et al. (U.S. Patent No. 5,960,276), of record.

With respect to claim 8, Mehta teaches implanting boron ions into the bottom and side walls of the isolation trench.

Thus, Mehta is shown to teach all the features of the claim with the exception of disclosing the concentration of the dopant.

However, Liaw teaches implanting boron into the side and bottom walls of the isolation trench at a concentration within the order of magnitude as claimed (E12).

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Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to implanting boron into the isolation trench (44) of Mehta at the concentration as taught by Liaw to reduce the reverse narrow width effect in the NMOS areas. (See col. 2, lines 2-18).

With respect to claims 9 and 10, Mehta teaches implanting ions into side and bottom walls of the isolation trench. To implant dopants into side and bottom walls of a trench, it is well known in the art that the implantation should be performed at angles.

Thus, Mehta is shown to teach all the features of the claim with the exception of explicitly disclosing the angle of the implantation.

However, Liaw teaches implanting ions into the side walls of the isolation trench at angle that includes the claimed range.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to performed the side walls implantation of Mehta at the angle as taught by Liaw to implant dopant into side walls. This is a common knowledge in the art.

Response to Arguments

10. Applicant's arguments filed November 3, 2003 have been fully considered but they are not persuasive.

With respect to the Objection, Applicants state: as shown in FIGS. 3 and 4A and 48 there is only one isolation trench 62 having a uniform cross-section.

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With all due respect, there are two trenches (62) sandwiching the active region. Further, the drawings, as well as the originally filed specification, do not prove that they are uniform cross section either.

The 35 U.S.C. 112 Rejection

All of the cited cases law fails to prove that two trenches 62 are actually one trench.

Also drawings alone show that there are two trenches 62 sandwiching an active region.

With respect to the language claim, the originally filed claims as well as specification and drawings do not include: a single trench having uniform cross-section. These new matters have only been added to the claims as well as specification following an Office Action.

Applicants should direct the Examiner to a specific portion of the originally filed specification that support his conclusion that the **trenches have uniform cross-section**.

Note that, it is within their right, Applicants can claim less than what they show. Additionally, in “an isolation trench”, the article “a or an” in English language is indefinite article. In patent law, a or an is used to introduce a matter.

A designation of number 62 to both trenches does not mean that they are the same in any respect. Number 62 is just directed to the trenches.

To disprove the Applicants assertion that an article having a same number should be the same. Attention is directed to the U.S Publication No. 20020137305. In the drawing Fig. 1A, below, all active region are designate 105b and all of the trenches are designate 130.

Are the active region (105b) the same size ?

Are the trenches (130) the same size and uniform cross-section ?

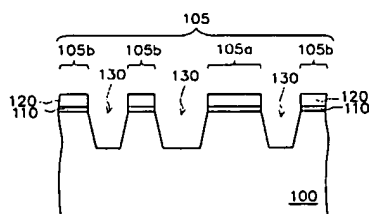


FIG. 1A

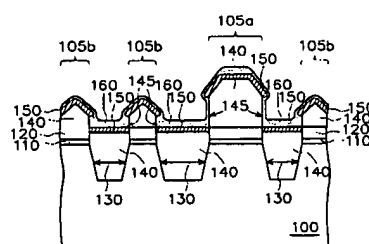
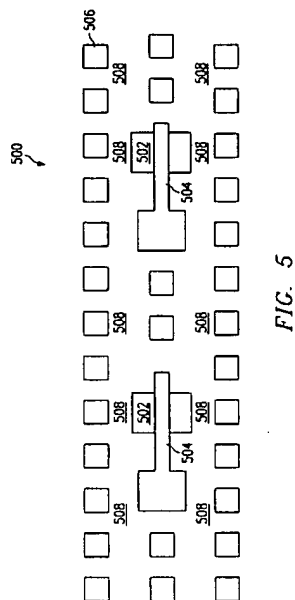


FIG. 1B

Corrections are permissible. However, corrections that **add new matters** to the specification are not.

With respect to the declaration, as clearly indicated previously, the declaration had been considered. However, it is not effective because the uniform cross-section is not a must since trenches that isolate an active region can be different in shapes and sizes. (See Mehta '063). To further elaborate that point, Applicant is urged to review U.S. Patent No. 5,909,628, with Fig. 5 is included below.

U.S. Patent Jun. 1, 1999 Sheet 7 of 7 5,909,628



The trenches (having a same number 508) that surround active region (502) do not seem to be the same in size and of course, do not seem to be: **must have uniform cross-section**.

With respect to the rejection under 35 U.S.C 112, second paragraph, again from all three previously mention references, more than one trench that is needed to define an active region.

Rejection under 35 U.S.C. 102 and 103

Applicants' argument seem to base solely on the new matter "single trench having uniform cross-section". As proven above, "single trench having uniform cross-section" is clearly new matter.

The rejections are maintained.

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

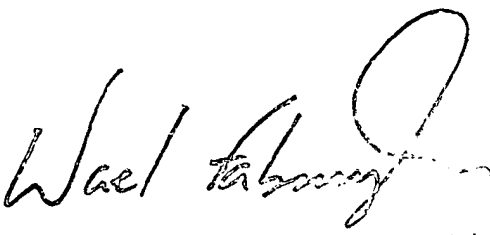
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh D. Mai whose telephone number is (571) 272-1710. The examiner can normally be reached on 9:00AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A.M
January 29, 2004



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